

Snake robot for object detection

Mehna U, Sherin C, Tony Varghese, Sathyanathan*

Abstract— the robot is controlled from the bluetooth communication using software application, right left and backward direction command from the application software will drive the robot in any desired direction. Microcontroller receives the data and performs the necessary movement using dc motors.

I. INTRODUCTION

A snake robot is a biomorphic hyper-redundant robot that resembles a biological snake. Snake robots come in many shapes and sizes.

The use of robots warfare, although, traditionally a topic for science fiction, is being researched as a possible future means of fighting wars. Already several military defense robots have been developed by various armies. The use of autonomous fighters and bombers to destroy enemy targets is especially promising because of the lack of training required for robotics pilots, autonomous planes are capable for performing maneuvers which could not otherwise be done with human pilots, plane designs do not require a life support system, and a loss of a plane does not mean a loss of a pilot.

II. DESIGN AND IMPLEMENTATION

Arduino is the main processing unit of the robot. Out of the 14 available digital I/O pins, 6 pins are used in this project design.

The ultrasonic sensor has 4 pins: Vcc, Trig, Echo is connected to 10th of the arduino.

L293D is a 16 Pin IC. Pins 1 and 9 are enable pins. They are connected to Vcc. Pins 2 and 7 are control inputs from microcontroller for first motor. They are connected to pins 9 and 8 of Arduino respectively.

Similarly, pins 10 and 15 are control inputs from microcontroller for second motor. They are connected to pins 4 and 3 of arduino. Pins 4, 5, 12 and 13 of L293D are ground pins and are connected to Gnd.

First motor is connected across the pins 3 and 6 of L293D. The second motor, which acts as the right wheel motor, is connected to 11 and 14 pins of L293D.

The 16th pin of L293D is Vcc1. This is connected to 5v Vcc. The 8th pin is Vcc2. This is the motor supply voltage. Motor driver boards are available with on-board 5v voltage regulator.

III. WORKING

Using an external trigger signal, the trig pin on ultrasonic sensor is made logic high. A sonic burst from the transmitter module is sent. This consists of 8 pulses of 40 KHz.

The signals return back after hitting a surface and the receiver detects this signal. The echo pin is high from the time of sending the signal and receiving it. This time can be converted to distance using appropriate calculations.

The aim of this project is to implement an obstacle avoiding robot using ultrasonic sensor and Arduino. All the connections are made as per the circuit diagram.

When the robot is powered on, both the motors of the robot will run normally and the robot moves forward. During this time, the ultrasonic sensor continuously calculates the distance between the robot and the reflective surface. This information is processed by Arduino. If the distance between the robot and the obstacle is less than 15cm, the left wheel motor is reversed in direction and right wheel motor is operated normally.

This will rotate the robot towards right. This rotation continues until the distance between the robot and any obstacle is greater than 15cm. The process continues forever and the robot keeps on moving without hitting any obstacle.

IV. METHODOLOGY

Microcontroller:

ATmega328 microcontroller based prototyping board. It is an open source electronic prototyping platform that can be used with various sensors and actuators.

ATmega328 has 14 digital I/O pins out of which 6 pins are used.

Ultrasonic sensor:

It is an ultrasonic range finder sensor. It is a non contact based distance measurement system and can measure distance of 2cm to 4m.

Motor Driver:

It takes a low current control signal but provides a higher current signal, thus acting as a current amplifier. The higher current signal drives the motors. L293D is a motor driver that allows direct current motor to drive in either direction.

Bluetooth Module:

Bluetooth is a wireless technology standard for exchanging data over short distances from fixed and mobile devices. It was originally conceived as a wireless alternative to RS-232

data cables.it can connect several devices, overcoming problems of synchronization.

V. RESULT

The robot is controlled from the bluetooth communication using application software forward; right left and backward direction command from the application software will drive the robot in any desired direction.

VI. CONCLUSION

Biologically inspired robots generally perform detection and identification.The ultrasonic receiver shall detect signal from the ultrasonic transmitter while the transmit waves hit on the object.the combinations of these two sensors will allow the robot to detect the object in its path.

REFERENCES

- [1] D.Floreaano andJ.Urzelai. “Evolutionary Robots with online self organization and Behavioral Fitness”,June 2000
- [2] Marija seder,”Hierarchical path planning of mobile robots in complex indoor environments”,June 2011,University of Zagreb
- [3] WinAVR.LINK:<http://winavr.sourceforge.net>.